

## SEQUENCE LISTING

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<120> METHODS OF USE OF THE ENZYMES OF MYCOTHIOIOL SYNTHESIS

<130> UCSD1420-1

<140> US 10/511,244

<141> 2003-04-15

<150> PCT/US 03/11539

<151> 2003-04-15

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<151> 2002-04-15

<160> 49

<170> PatentIn version 3.1

<210> 1

<211> 1236

<212> DNA

<213> Mycobacterium smegmatis

<400> 1

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tacgtgtgcg gcatcacccc atacgacgcg acccatctgg gtcacgccgc gacctatctg      180
acgttcgacc tgggtgcatcg cctatggctc gacgccggac acaccgtgca gtacgtccag      240
aacgtcaccg acgtggacga cccgttggtc gagcgtgctg agcgcgacgg catcgactgg      300
cggacgctgg gcgaccgcga gacgcagctg ttccgtgagg acatggccgc gttgcgcgtg      360
ctgccccgcg acgactacgt cgccgcgacc gacgcgatcg ccgaggtcgt cgagatggtc      420
gagaagctgc tggcctcggg tgcggcgtag atcgtcgagg acgccgagta ccccgacgtg      480
tacttccgcg ccgacgccac cgcgagttc gggtacgagt ccggctacga ccgcgacacc      540
atgctcacgt tggtcgccga acgcggcggg gacccggacc gcccgggcaa gtccgatcaa      600
ctcgacgcgt tgctgtggcg cgccgagcgt cctggcgagc ccagctggcc ttcgccgttc      660
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ggccggggcc ggcccggctg gcacgtggaa tgttcggcga tcgccctgac gcggatcggc 720
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gccgcgcacg ccgaatccgt caccgggtgag cgacgattcg cagccacta cgtgcacacc 840
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<210> 2
<211> 412
<212> PRT
<213> Mycobacterium smegmatis

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<400> 2
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Met Gln Ser Trp Ser Ala Pro Ala Ile Pro Val Val Pro Gly Arg Gly
1           5           10           15

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```

Pro Ala Leu Arg Leu Phe Asp Ser Ala Asp Arg Gln Val Arg Pro Val
          20           25           30

```

```

Thr Pro Gly Pro Thr Ala Thr Met Tyr Val Cys Gly Ile Thr Pro Tyr
          35           40           45

```

```

Asp Ala Thr His Leu Gly His Ala Ala Thr Tyr Leu Thr Phe Asp Leu
          50           55           60

```

```

Val His Arg Leu Trp Leu Asp Ala Gly His Thr Val Gln Tyr Val Gln
          65           70           75           80

```

```

Asn Val Thr Asp Val Asp Asp Pro Leu Phe Glu Arg Ala Glu Arg Asp
          85           90           95

```

```

Gly Ile Asp Trp Arg Thr Leu Gly Asp Arg Glu Thr Gln Leu Phe Arg
          100          105          110

```

```

Glu Asp Met Ala Ala Leu Arg Val Leu Pro Pro His Asp Tyr Val Ala
          115          120          125

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```

Ala Thr Asp Ala Ile Ala Glu Val Val Glu Met Val Glu Lys Leu Leu

```

130	135	140
Ala Ser Gly Ala Ala Tyr Ile Val Glu Asp Ala Glu Tyr Pro Asp Val 145 150 155 160		
Tyr Phe Arg Ala Asp Ala Thr Ala Gln Phe Gly Tyr Glu Ser Gly Tyr 165 170 175		
Asp Arg Asp Thr Met Leu Thr Leu Phe Ala Glu Arg Gly Gly Asp Pro 180 185 190		
Asp Arg Pro Gly Lys Ser Asp Gln Leu Asp Ala Leu Leu Trp Arg Ala 195 200 205		
Glu Arg Pro Gly Glu Pro Ser Trp Pro Ser Pro Phe Gly Arg Gly Arg 210 215 220		
Pro Gly Trp His Val Glu Cys Ser Ala Ile Ala Leu Thr Arg Ile Gly 225 230 235 240		
Thr Gly Leu Asp Ile Gln Gly Gly Gly Ser Asp Leu Ile Phe Pro His 245 250 255		
His Glu Tyr Ser Ala Ala His Ala Glu Ser Val Thr Gly Glu Arg Arg 260 265 270		
Phe Ala Arg His Tyr Val His Thr Gly Met Ile Gly Trp Asp Gly His 275 280 285		
Lys Met Ser Lys Ser Arg Gly Asn Leu Val Leu Val Ser Gln Leu Arg 290 295 300		
Ala Gln Gly Val Asp Pro Ser Ala Ile Arg Leu Gly Leu Phe Ser Gly 305 310 315 320		
His Tyr Arg Glu Asp Arg Phe Trp Ser Asn Glu Val Leu Asp Glu Ala 325 330 335		
Asn Ala Arg Leu Ala Arg Trp Arg Ser Ala Thr Ala Leu Pro Glu Ala 340 345 350		
Pro Asp Ala Thr Asp Val Ile Ala Arg Val Arg Gln Tyr Leu Ala Asp 355 360 365		
Asp Leu Asp Thr Pro Lys Ala Leu Ala Ala Leu Asp Gly Trp Cys Thr 370 375 380		

Asp Ala Leu Ser Tyr Gly Gly His Asp Thr Glu Ser Pro Arg Leu Val  
 385 390 395 400

Ala Thr Thr Val Asp Ala Leu Leu Gly Val Asp Leu  
 405 410

<210> 3  
 <211> 1242  
 <212> DNA  
 <213> Mycobacterium tuberculosis

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 tacgtctgcg ggatcacgcc ctacgacgcc acgcatctgg gccatgctgc cacctatgtg 180  
 acgttcgacc tgatccatcg gctgtggctg gatctcggtc atgaattgca ctatgtccag 240  
 aacatcaccg acatcgacga tccactatth gagcgcgcgg atcgcgacgg tgcgactgg 300  
 cgtgaccttg cccaagccga ggtcgccctg ttctgtgagg acatggcggc gctgcgggtg 360  
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 gaaaaaatgc tggcgtgcgg ggccggcctat gtcatagacc gggaaatggg agagtaccag 480  
 gacatctact tccgcgctga cgccaccctg cagttcggct acgagtcagg gtatgaccgt 540  
 gacaccatgc tgcggctgtg cgaggaacgt ggccggcgatc cgccggcgccc cggcaagagc 600  
 gacgaactcg acgcgttggt gtggcgggcc gcgcggcccg gtgagcccag ctggccgtcc 660  
 ccgttcgggc ctggccggcc aggctggcat gtcgagtgcg cagccatcgc gctcagtcgt 720  
 atcgggaagcg gcctcgacat ccaggggcggg ggtagcgatc tgatctttcc gcaccacgag 780  
 ttcaccgctg cgcacgccga atgtgtcagc ggccgaacggc gattcgcgcg gcactacgtg 840  
 catgccggga tgatcggtcg ggacgggcac aagatgtcaa agagccgcgg caacctcgtg 900  
 ctggtgtcgg cgctgcgtgc gcaggacgtt gagccatcgg cggttcgggt gggtttgctc 960  
 gccggacact accgagccga tcggttctgg agccagcagg tgcttgacga ggcgaccgcc 1020  
 cggctgcacc gttggcgcac cgcaaccgca ctcccgccg gtccggccgc agttgacgtt 1080  
 gtcgctcggg tgcgccgcta cctggccgac gatctcgata cgcccaaagc gattgccgca 1140  
 ctggatggtt gggtcaccga tgcggtggag tacggcgggc acgatgccgg ggcgccgaag 1200  
 ttggtggcga cggcgatcga tgccctgctc ggggtggacc tg 1242

<210> 4  
 <211> 414

<212> PRT  
 <213> Mycobacterium tuberculosis

<400> 4

Met Gln Ser Trp Tyr Cys Pro Pro Val Pro Val Leu Pro Gly Arg Gly  
 1 5 10 15

Pro Gln Leu Arg Leu Tyr Asp Ser Ala Asp Arg Gln Val Arg Pro Val  
 20 25 30

Ala Pro Gly Ser Lys Ala Thr Met Tyr Val Cys Gly Ile Thr Pro Tyr  
 35 40 45

Asp Ala Thr His Leu Gly His Ala Ala Thr Tyr Val Thr Phe Asp Leu  
 50 55 60

Ile His Arg Leu Trp Leu Asp Leu Gly His Glu Leu His Tyr Val Gln  
 65 70 75 80

Asn Ile Thr Asp Ile Asp Asp Pro Leu Phe Glu Arg Ala Asp Arg Asp  
 85 90 95

Gly Val Asp Trp Arg Asp Leu Ala Gln Ala Glu Val Ala Leu Phe Cys  
 100 105 110

Glu Asp Met Ala Ala Leu Arg Val Leu Pro Pro Gln Asp Tyr Val Gly  
 115 120 125

Ala Thr Glu Ala Ile Ala Glu Met Val Glu Leu Ile Glu Lys Met Leu  
 130 135 140

Ala Cys Gly Ala Ala Tyr Val Ile Asp Arg Glu Met Gly Glu Tyr Gln  
 145 150 155 160

Asp Ile Tyr Phe Arg Ala Asp Ala Thr Leu Gln Phe Gly Tyr Glu Ser  
 165 170 175

Gly Tyr Asp Arg Asp Thr Met Leu Arg Leu Cys Glu Glu Arg Gly Gly  
 180 185 190

Asp Pro Arg Arg Pro Gly Lys Ser Asp Glu Leu Asp Ala Leu Leu Trp  
 195 200 205

Arg Ala Ala Arg Pro Gly Glu Pro Ser Trp Pro Ser Pro Phe Gly Pro  
 210 215 220

Gly Arg Pro Gly Trp His Val Glu Cys Ala Ala Ile Ala Leu Ser Arg  
 225 230 235 240

Ile Gly Ser Gly Leu Asp Ile Gln Gly Gly Gly Ser Asp Leu Ile Phe  
 245 250 255

Pro His His Glu Phe Thr Ala Ala His Ala Glu Cys Val Ser Gly Glu  
 260 265 270

Arg Arg Phe Ala Arg His Tyr Val His Ala Gly Met Ile Gly Trp Asp  
 275 280 285

Gly His Lys Met Ser Lys Ser Arg Gly Asn Leu Val Leu Val Ser Ala  
 290 295 300

Leu Arg Ala Gln Asp Val Glu Pro Ser Ala Val Arg Leu Gly Leu Leu  
 305 310 315 320

Ala Gly His Tyr Arg Ala Asp Arg Phe Trp Ser Gln Gln Val Leu Asp  
 325 330 335

Glu Ala Thr Ala Arg Leu His Arg Trp Arg Thr Ala Thr Ala Leu Pro  
 340 345 350

Ala Gly Pro Ala Ala Val Asp Val Val Ala Arg Val Arg Arg Tyr Leu  
 355 360 365

Ala Asp Asp Leu Asp Thr Pro Lys Ala Ile Ala Ala Leu Asp Gly Trp  
 370 375 380

Val Thr Asp Ala Val Glu Tyr Gly Gly His Asp Ala Gly Ala Pro Lys  
 385 390 395 400

Leu Val Ala Thr Ala Ile Asp Ala Leu Leu Gly Val Asp Leu  
 405 410

<210> 5  
 <211> 404  
 <212> PRT  
 <213> Corynebacterium striatum

<400> 5

Met His Ala Trp Pro Asp Pro Ser Val Pro Ala Val Ala Gly Thr Pro  
 1 5 10 15

Val Pro Leu Lys Leu Phe Asp Thr Ala Asp Gln Arg Val Lys Glu Val  
 20 25 30

Asp Thr Thr Pro Asp Ala Asn Gly Glu Val Gly Met Tyr Val Cys Gly  
 35 40 45

Ile Thr Pro Tyr Asp Ser Thr His Leu Gly His Ala Ala Thr Tyr Leu  
 50 55 60

Thr Phe Asp Leu Ala Gln Arg Gln Leu Leu Ala Asn Gly His Lys Val  
 65 70 75 80

His Tyr Val Gln Asn Ile Thr Asp Val Asp Asp Pro Leu Phe Glu Arg  
 85 90 95

Ala Glu Arg Asp Gly Val Asp Trp Arg Glu Leu Gly Thr Ser Gln Ile  
 100 105 110

Asn Leu Phe Arg Ser Asp Met Glu Ile Leu Ser Val Ile Pro Pro Cys  
 115 120 125

Asp Tyr Ile Gly Ala Met Glu Ser Val Asp Glu Val Ile Ala Met Val  
 130 135 140

Gln Gln Leu Leu Asp Ala Gly Ala Ala Tyr Glu Leu Asp Gln Gly Asp  
 145 150 155 160

Ile Tyr Ala Ser Ile Asp Ala Thr Glu Gln Phe Gly Tyr Glu Ser Asn  
 165 170 175

Leu Asp Arg Ala Thr Met Glu Glu Tyr Phe Ala Glu Arg Gly Gly Asp  
 180 185 190

Pro Asp Arg Glu Gly Lys Arg Asp Pro Leu Asp Ala Leu Val Trp Arg  
 195 200 205

Gly His Arg Glu Gly Glu Pro Ala Trp Asp Ser Pro Phe Gly Pro Gly  
 210 215 220

Arg Pro Gly Trp His Val Glu Cys Ser Ala Ile Ala Thr Asn Arg Leu  
 225 230 235 240

Gly Ser His Phe Ala Ile Gln Gly Gly Gly Ser Asp Leu Ala Phe Pro  
 245 250 255

His His Glu Phe Ser Ala Ala His Ala Glu Ala Ala Leu Lys Val Glu  
 260 265 270

Arg Met Ala Gly His Tyr Val His Ala Gly Met Ile Ala Leu Asp Gly  
 275 280 285

Val Lys Met Ser Lys Ser Leu Gly Asn Leu Val Phe Val His Lys Leu  
 290 295 300

Ser Glu Ala Gly His Asp Pro Ser Ala Ile Arg Leu Ala Val Phe Ala  
 305 310 315 320

Gly His Tyr Arg Glu Asp Arg Asp Phe Ser Asp Ala Ile Leu Ala Glu  
 325 330 335

Ala Glu Glu Arg Leu Thr Arg Trp Arg Glu Gln Leu Ala Gly Glu Val  
 340 345 350

Ser Glu Ala Glu Ala Thr Glu Val Val Asp Lys Leu Arg Ala Ile Leu  
 355 360 365

Ala Asp Asp Leu Asn Thr Pro Glu Ala Leu Ser Leu Leu Asp Gly Ala  
 370 375 380

Ala Gly Asp Cys Asn Gln Ile Ile Ala Thr Ala Leu Asp Gly Leu Leu  
 385 390 395 400

Gly Val Arg Ile

<210> 6  
 <211> 409  
 <212> PRT  
 <213> Streptomyces coelicolor

<400> 6

Met His Ala Trp Pro Ala Ser Glu Val Pro Ala Leu Pro Gly Gln Gly  
 1 5 10 15

Arg Asp Leu Arg Ile His Asp Thr Ala Thr Gly Gly Pro Val Thr Leu  
 20 25 30

Asp Pro Gly Pro Val Ala Arg Ile Tyr Val Cys Gly Ile Thr Pro Tyr  
 35 40 45

Asp Ala Thr His Met Gly His Ala Ala Thr Tyr Asn Ala Phe Asp Leu  
 50 55 60

Val Gln Arg Val Trp Leu Asp Thr Lys Arg Gln Val His Tyr Val Gln

65	70	75	80
Asn Val Thr Asp	Val Asp Asp Pro Leu	Leu Glu Arg Ala Val Arg Asp	
	85	90	95
Gly Val Asp Trp Thr Ala Leu Ala	Glu Gln Glu Thr Ala Leu Phe Arg		
	100	105	110
Glu Asp Met Thr Ala Leu Arg	Met Leu Pro Pro Gln His Tyr Ile Gly		
	115	120	125
Ala Val Glu Ala Ile Pro Gly Ile Val Pro Leu	Val Glu Arg Leu Arg		
	130	135	140
Asp Ala Gly Ala Ala Tyr Glu Leu Glu Gly Asp	Val Tyr Phe Ser Val		
	145	150	155
Glu Ala Asp Pro His Phe Gly Gly Val Ser His Leu Asp Ala Ala Thr			
	165	170	175
Met Arg Leu Leu Ser Ala Glu Arg Gly Gly Asp Pro Asp Arg Pro Gly			
	180	185	190
Lys Lys Asn Pro Leu Asp Pro Met Leu Trp Met Ala Ala Arg Glu Gly			
	195	200	205
Glu Pro Ser Trp Asp Gly Gly Thr Leu Gly Arg Gly Arg Pro Gly Trp			
	210	215	220
His Ile Glu Cys Val Ala Ile Ala Leu Asp His Leu Gly Met Gly Phe			
	225	230	235
Asp Val Gln Gly Gly Gly Ser Asp Leu Ala Phe Pro His His Glu Met			
	245	250	255
Gly Ala Ser His Ala Gln Ala Leu Thr Gly Glu Phe Pro Met Ala Lys			
	260	265	270
Ala Tyr Val His Ala Gly Met Val Gly Leu Asp Gly Glu Lys Met Ser			
	275	280	285
Lys Ser Lys Gly Asn Leu Val Phe Val Ser Gln Leu Arg Arg Glu Gly			
	290	295	300
Val Asp Pro Ala Ala Ile Arg Leu Thr Leu Leu Ala His His Tyr Arg			
	305	310	315
			320

Ser Asp Trp Glu Trp Thr Asp Gln Val Leu Gln Asp Ala Leu Ala Arg  
                   325                  330                  335

Leu Asp Arg Trp Arg Ala Ala Val Ser Arg Pro Asp Gly Pro Pro Ala  
                   340                  345                  350

Glu Ala Leu Val Glu Glu Ile Arg Glu Ala Leu Ala Asn Asp Leu Asp  
                   355                  360                  365

Ser Pro Ala Ala Leu Ala Ala Val Asp Arg Trp Ala Ala Leu Gln Gln  
                   370                  375                  380

Glu Ser Gly Gly Thr Asp Ile Gly Ala Pro Gly Val Val Ser Arg Ala  
                   385                  390                  395                  400

Val Asp Ala Leu Leu Gly Val Ala Leu  
                   405

<210> 7  
 <211> 20  
 <212> PRT  
 <213> Mycobacterium smegmatis

<400> 7

Met Gln Ser Trp Ser Ala Pro Ala Ile Pro Val Val Pro Gly Arg Gly  
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Pro Ala Leu Arg  
                   20

<210> 8  
 <211> 18  
 <212> PRT  
 <213> Mycobacterium smegmatis

<220>  
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 <222> (1)..(1)  
 <223> Xaa is Gly, Ser or Met

<220>  
 <221> MISC\_FEATURE  
 <222> (2)..(2)  
 <223> Xaa is Glu or Gln

<220>  
 <221> MISC\_FEATURE  
 <222> (13)..(13)

<223> Xaa is Ser, Asp or Pro

<400> 8

Xaa	Xaa	His	Leu	Lys	Val	Asp	Ala	Met	Gln	Ser	Trp	Xaa	Ala	Pro	Ala
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Ile Pro

<210> 9

<211> 18

<212> PRT

<213> Mycobacterium smegmatis

<400> 9

Ser	Glu	His	Leu	Lys	Val	Asp	Ala	Met	Gln	Ser	Trp	Ser	Ala	Pro	Ala
1				5					10					15	

Ile Pro

<210> 10

<211> 28

<212> DNA

<213> Artificial sequence

<220>

<223> PCR primer

<400> 10

gcgatccat gcagtcgtgg tattgccc

28

<210> 11

<211> 28

<212> DNA

<213> Artificial sequence

<220>

<223> PCR primer

<400> 11

ccaagcttct acaggtccac cccgagca

28

<210> 12

<211> 469

<212> PRT

<213> Mycobacterium tuberculosis

<400> 12

Met	Thr	Asp	Arg	Ala	Arg	Leu	Arg	Leu	His	Asp	Thr	Ala	Ala	Gly	Val
1				5					10					15	

Val Arg Asp Phe Val Pro Leu Arg Pro Gly His Val Ser Ile Tyr Leu  
 20 25 30

Cys Gly Ala Thr Val Gln Gly Leu Pro His Ile Gly His Val Arg Ser  
 35 40 45

Gly Val Ala Phe Asp Ile Leu Arg Arg Trp Leu Leu Ala Arg Gly Tyr  
 50 55 60

Asp Val Ala Phe Ile Arg Asn Val Thr Asp Ile Glu Asp Lys Ile Leu  
 65 70 75 80

Ala Lys Ala Ala Ala Ala Gly Arg Pro Trp Trp Glu Trp Ala Ala Thr  
 85 90 95

His Glu Arg Ala Phe Thr Ala Ala Tyr Asp Ala Leu Asp Val Leu Pro  
 100 105 110

Pro Ser Ala Glu Pro Arg Ala Thr Gly His Ile Thr Gln Met Ile Glu  
 115 120 125

Met Ile Glu Arg Leu Ile Gln Ala Gly His Ala Tyr Thr Gly Gly Gly  
 130 135 140

Asp Val Tyr Phe Asp Val Leu Ser Tyr Pro Glu Tyr Gly Gln Leu Ser  
 145 150 155 160

Gly His Lys Ile Asp Asp Val His Gln Gly Glu Gly Val Ala Ala Gly  
 165 170 175

Lys Arg Asp Gln Arg Asp Phe Thr Leu Trp Lys Gly Glu Lys Pro Gly  
 180 185 190

Glu Pro Ser Trp Pro Thr Pro Trp Gly Arg Gly Arg Pro Gly Trp His  
 195 200 205

Leu Glu Cys Ser Ala Met Ala Arg Ser Tyr Leu Gly Pro Glu Phe Asp  
 210 215 220

Ile His Cys Gly Gly Met Asp Leu Val Phe Pro His His Glu Asn Glu  
 225 230 235 240

Ile Ala Gln Ser Arg Ala Ala Gly Asp Gly Phe Ala Arg Tyr Trp Leu  
 245 250 255

His Asn Gly Trp Val Thr Met Gly Gly Glu Lys Met Ser Lys Ser Leu  
 260 265 270

Gly Asn Val Leu Ser Met Pro Ala Met Leu Gln Arg Val Arg Pro Ala  
 275 280 285

Glu Leu Arg Tyr Tyr Leu Gly Ser Ala His Tyr Arg Ser Met Leu Glu  
 290 295 300

Phe Ser Glu Thr Ala Met Gln Asp Ala Val Lys Ala Tyr Val Gly Leu  
 305 310 315 320

Glu Asp Phe Leu His Arg Val Arg Thr Arg Val Gly Ala Val Cys Pro  
 325 330 335

Gly Asp Pro Thr Pro Arg Phe Ala Glu Ala Leu Asp Asp Asp Leu Ser  
 340 345 350

Val Pro Ile Ala Leu Ala Glu Ile His His Val Arg Ala Glu Gly Asn  
 355 360 365

Arg Ala Leu Asp Ala Gly Asp His Asp Gly Ala Leu Arg Ser Ala Ser  
 370 375 380

Ala Ile Arg Ala Met Met Gly Ile Leu Gly Cys Asp Pro Leu Asp Gln  
 385 390 395 400

Arg Trp Glu Ser Arg Asp Glu Thr Ser Ala Ala Leu Ala Ala Val Asp  
 405 410 415

Val Leu Val Gln Ala Glu Leu Gln Asn Arg Glu Lys Ala Arg Glu Gln  
 420 425 430

Arg Asn Trp Ala Leu Ala Asp Glu Ile Arg Gly Arg Leu Lys Arg Ala  
 435 440 445

Gly Ile Glu Val Thr Asp Thr Ala Asp Gly Pro Gln Trp Ser Leu Leu  
 450 455 460

Gly Gly Asp Thr Lys  
 465

<210> 13  
 <211> 461  
 <212> PRT  
 <213> Escherichia coli

&lt;400&gt; 13

Met Leu Lys Ile Phe Asn Thr Leu Thr Arg Gln Lys Glu Glu Phe Lys  
 1 5 10 15

Pro Ile His Ala Gly Glu Val Gly Met Tyr Val Cys Gly Ile Thr Val  
 20 25 30

Tyr Asp Leu Cys His Ile Gly His Gly Arg Thr Phe Val Ala Phe Asp  
 35 40 45

Val Val Ala Arg Tyr Leu Arg Phe Leu Gly Tyr Lys Leu Lys Tyr Val  
 50 55 60

Arg Asn Ile Thr Asp Ile Asp Asp Lys Ile Ile Lys Arg Ala Asn Glu  
 65 70 75 80

Asn Gly Glu Ser Phe Val Ala Leu Val Asp Arg Met Ile Ala Glu Met  
 85 90 95

His Lys Asp Phe Asp Ala Leu Asn Ile Leu Arg Pro Asp Met Glu Pro  
 100 105 110

Arg Ala Thr His His Ile Ala Glu Ile Ile Glu Leu Thr Glu Gln Leu  
 115 120 125

Ile Ala Lys Gly His Ala Tyr Val Ala Asp Asn Gly Asp Val Met Phe  
 130 135 140

Asp Val Pro Thr Asp Pro Thr Tyr Gly Val Leu Ser Arg Gln Asp Leu  
 145 150 155 160

Asp Gln Leu Gln Ala Gly Ala Arg Val Asp Val Val Asp Asp Lys Arg  
 165 170 175

Asn Pro Met Asp Phe Val Leu Trp Lys Met Ser Lys Glu Gly Glu Pro  
 180 185 190

Ser Trp Pro Ser Pro Trp Gly Ala Gly Arg Pro Gly Trp His Ile Glu  
 195 200 205

Cys Ser Ala Met Asn Cys Lys Gln Leu Gly Asn His Phe Asp Ile His  
 210 215 220

Gly Gly Gly Ser Asp Leu Met Phe Pro His His Glu Asn Glu Ile Ala  
 225 230 235 240

Gln Ser Thr Cys Ala His Asp Gly Gln Tyr Val Asn Tyr Trp Met His  
                   245                  250                  255

Ser Gly Met Val Met Val Asp Arg Glu Lys Met Ser Lys Ser Leu Gly  
                   260                  265                  270

Asn Phe Phe Thr Val Arg Asp Val Leu Lys Tyr Tyr Asp Ala Glu Thr  
                   275                  280                  285

Val Arg Tyr Phe Leu Met Ser Gly His Tyr Arg Ser Gln Leu Asn Tyr  
                   290                  295                  300

Ser Glu Glu Asn Leu Lys Gln Ala Arg Ala Ala Leu Glu Arg Leu Tyr  
   305                  310                  315                  320

Thr Ala Leu Arg Gly Thr Asp Lys Thr Val Ala Pro Ala Gly Gly Glu  
                   325                  330                  335

Ala Phe Glu Ala Arg Phe Ile Glu Ala Met Asp Asp Asp Phe Asn Thr  
                   340                  345                  350

Pro Glu Ala Tyr Ser Val Leu Phe Asp Met Ala Arg Glu Val Asn Arg  
                   355                  360                  365

Leu Lys Val Glu Asp Met Ala Ala Ala Asn Ala Met Ala Ser His Leu  
   370                  375                  380

Arg Lys Leu Ser Ala Val Leu Gly Leu Leu Glu Gln Glu Pro Glu Ala  
   385                  390                  395                  400

Phe Leu Gln Ser Gly Ala Gln Ala Asp Asp Ser Glu Val Ala Glu Ile  
                   405                  410                  415

Glu Ala Leu Ile Gln Gln Arg Leu Asp Ala Arg Lys Ala Lys Asp Trp  
                   420                  425                  430

Ala Ala Ala Asp Ala Ala Arg Asp Arg Leu Asn Glu Met Gly Ile Val  
                   435                  440                  445

Leu Glu Asp Gly Pro Gln Gly Thr Thr Trp Arg Arg Lys  
   450                  455                  460

<210> 14  
 <211> 315  
 <212> PRT

<213> Mycobacterium tuberculosis

<400> 14

Met Thr Ala Leu Asp Trp Arg Ser Ala Leu Thr Ala Asp Glu Gln Arg  
1 5 10 15

Ser Val Arg Ala Leu Val Thr Ala Thr Thr Ala Val Asp Gly Val Ala  
20 25 30

Pro Val Gly Glu Gln Val Leu Arg Glu Leu Gly Gln Gln Arg Thr Glu  
35 40 45

His Leu Leu Val Ala Gly Ser Arg Pro Gly Gly Pro Ile Ile Gly Tyr  
50 55 60

Leu Asn Leu Ser Pro Pro Arg Gly Ala Gly Gly Ala Met Ala Glu Leu  
65 70 75 80

Val Val His Pro Gln Ser Arg Arg Arg Gly Ile Gly Thr Ala Met Ala  
85 90 95

Arg Ala Ala Leu Ala Lys Thr Ala Gly Arg Asn Gln Phe Trp Ala His  
100 105 110

Gly Thr Leu Asp Pro Ala Arg Ala Thr Ala Ser Ala Leu Gly Leu Val  
115 120 125

Gly Val Arg Glu Leu Ile Gln Met Arg Arg Pro Leu Arg Asp Ile Pro  
130 135 140

Glu Pro Thr Ile Pro Asp Gly Val Val Ile Arg Thr Tyr Ala Gly Thr  
145 150 155 160

Ser Asp Asp Ala Glu Leu Leu Arg Val Asn Asn Ala Ala Phe Ala Gly  
165 170 175

His Pro Glu Gln Gly Gly Trp Thr Ala Val Gln Leu Ala Glu Arg Arg  
180 185 190

Gly Glu Ala Trp Phe Asp Pro Asp Gly Leu Ile Leu Ala Phe Gly Asp  
195 200 205

Ser Pro Arg Glu Arg Pro Gly Arg Leu Leu Gly Phe His Trp Thr Lys  
210 215 220

Val His Pro Asp His Pro Gly Leu Gly Glu Val Tyr Val Leu Gly Val



Glu Leu Leu Gln Met Arg Arg Pro Leu Thr Asp Leu Pro Pro Val Pro  
 130 135 140

Asp Thr Pro Gly Val Arg Ile Ala Thr Tyr Ala Gly Pro Gly Asp Asp  
 145 150 155 160

Ala Glu Ile Leu Arg Val Asn Asn Ala Ala Phe Ser Trp His Pro Glu  
 165 170 175

Gln Gly Gly Trp Thr Glu His Glu Ile Asp Glu Arg Arg Asn Glu Gly  
 180 185 190

Trp Phe Asp Pro Glu Gly Leu Phe Gln Ala Phe Asp Glu Gln Thr Gly  
 195 200 205

Ser Leu Leu Gly Phe His Trp Thr Lys Ile His Asp Ala Ser Leu Gly  
 210 215 220

Glu Val Tyr Val Val Gly Val Asp Pro Gln Ala Gln Gly Arg Gly Leu  
 225 230 235 240

Gly Tyr Thr Leu Thr Leu Ile Gly Leu His His Leu Ala Glu Lys Leu  
 245 250 255

Ala Gly Pro Glu Pro Thr Val Leu Leu Tyr Val Glu Ala Asp Asn Ser  
 260 265 270

Ala Ala Val Asn Thr Tyr Arg Lys Leu Gly Phe Glu Val Phe Ser Val  
 275 280 285

Asp Ala Ala Tyr Ala Ala Asn  
 290 295

<210> 16  
 <211> 311  
 <212> PRT  
 <213> Mycobacterium leprae

<400> 16

Met Val Leu Asn Trp Arg Phe Ala Leu Ser Ala Asp Glu Gln Arg Leu  
 1 5 10 15

Val Arg Glu Ile Ile Ser Ala Ala Thr Glu Phe Asp Glu Val Ser Pro  
 20 25 30

Val Gly Glu Gln Val Leu Arg Glu Leu Gly Tyr Asp Arg Thr Glu His

35	40	45
Leu Leu Val Thr Asp Ser Arg Pro Tyr Ala Pro Ile Ile Gly Tyr Leu		
50	55	60
Asn Leu Ser Ser Pro Arg Asp Ala Gly Val Ala Met Ala Glu Leu Val		
65	70	75
Val His Pro Arg Glu Arg Arg Arg Gly Val Gly Ala Ala Met Val Arg		
	85	90
Ala Ala Leu Ala Lys Thr Gly Gly Arg Asn Arg Phe Trp Ala His Gly		
	100	105
Thr Leu Ala Ser Ala Arg Ala Thr Ala Ser Val Leu Gly Leu Val Pro		
	115	120
Val Arg Glu Leu Val Gln Met Gln Arg Ser Leu Arg Thr Ile Pro Asp		
	130	135
Pro Met Val Pro Asp Gln Leu Gly Val Trp Val Arg Thr Tyr Val Gly		
	145	150
Thr Val Asp Asp Ala Glu Leu Leu Arg Val Asn Asn Ala Ala Phe Ala		
	165	170
Gly His Pro Glu Gln Gly Gly Trp Thr Ala Thr Gln Leu Ala Glu Arg		
	180	185
Arg Ser Glu Pro Trp Phe Asp Pro Ala Gly Leu Phe Leu Ala Phe Gly		
	195	200
Asp Ser Ser Ser Asn Gln Pro Gly Lys Leu Leu Gly Phe His Trp Thr		
	210	215
Lys Val His Ala Ala His Pro Gly Leu Gly Glu Val Tyr Val Leu Gly		
	225	230
Val Asp Pro Ser Ala Gln Gly Arg Gly Leu Gly Gln Met Leu Thr Ser		
	245	250
Ile Gly Ile Ala Ser Leu Ala Gln Arg Leu Val Gly Pro Ser Ala Glu		
	260	265
Pro Thr Val Met Leu Tyr Val Glu Ser Asp Asn Val Ala Ala Ala Arg		
	275	280
		285

Thr Tyr Glu Arg Leu Gly Phe Thr Thr Tyr Ser Val Asp Thr Ala Tyr  
 290 295 300

Ala Leu Ala Arg Ile Asp Asp  
 305 310

◦  
 <210> 17  
 <211> 309  
 <212> PRT  
 <213> Streptomyces coelicolor

<400> 17

Met Thr Ser Asp Asp Thr Val Arg Pro Gly Arg Pro Arg Ser Ile Glu  
 1 5 10 15

Thr Leu Ala Glu Leu Thr Pro Glu Gln Thr Asp Ala Val Leu Ala Leu  
 20 25 30

Leu Thr Glu Ala Ala Arg Thr Asp Gly Gln His Ala Val Ser Glu Gln  
 35 40 45

Gly Arg Leu Gln Leu Arg Gly Pro Ala Arg Glu Gly Val Val His Leu  
 50 55 60

Leu Leu Thr Leu Asp Gly Gly Glu Leu Val Gly Tyr Ala Gln Leu Glu  
 65 70 75 80

Gly Thr Asp Pro Val Glu Pro Pro Ala Ala Glu Leu Val Val His Pro  
 85 90 95

Ser His Arg Gly Gln Gly His Gly Arg Ala Leu Gly Ser Ala Leu Leu  
 100 105 110

Ala Ala Ser Gly Lys Arg Leu Arg Ile Trp Ala His Gly Gly His Ser  
 115 120 125

Ala Ala Arg His Leu Ala Gln Val Leu Gly Leu Ser Leu Phe Arg Glu  
 130 135 140

Leu Arg Gln Leu Arg Arg Pro Leu Thr Gly Leu Asp Leu Pro Glu Pro  
 145 150 155 160

Arg Leu Pro Glu Gly Val Ser Val Arg Thr Phe Val Pro Gly Gln Asp  
 165 170 175

Asp Ala Ala Trp Leu Ala Val Asn Ala Ala Ala Phe Ala His His Pro  
 180 185 190

Glu Gln Gly Ser Leu Thr Gln Arg Asp Leu Asp Asp Arg Lys Ala Glu  
 195 200 205

Pro Trp Phe Asp Pro Ala Gly Phe Phe Leu Ala Glu Arg Asp Gly Glu  
 210 215 220

Leu Ile Gly Phe His Trp Thr Lys Val His Ala Glu Glu Arg Leu Gly  
 225 230 235 240

Glu Val Tyr Val Leu Gly Ile Arg Pro Asp Thr Gln Gly Gly Gly Leu  
 245 250 255

Gly Lys Ala Leu Thr Thr Ile Gly Leu Arg His Leu Glu Gly Gln Gly  
 260 265 270

Leu Pro Thr Ala Met Leu Tyr Val Asp Ala Asp Asn Lys Ala Ala Val  
 275 280 285

Ala Val Tyr Glu Arg Leu Gly Phe Val Thr His Glu Thr Asp Leu Met  
 290 295 300

Tyr Arg Thr Glu Thr  
 305

<210> 18  
 <211> 301  
 <212> PRT  
 <213> Corynebacterium diphtheriae

<400> 18

Met Ile Glu Thr Ser Leu Ala Ser Ala Ser Ala Ala Leu Arg Asp Arg  
 1 5 10 15

Val Asp Glu Ile Leu Ala Ala Ala Thr Arg Glu Asp Gly Cys Ala Pro  
 20 25 30

Leu Ser Glu Ser Phe Leu Asn Gly Leu Arg Arg Ala Asp Asp Gly His  
 35 40 45

Val His Ser Cys Val Met Asp Ser His Asp Gln Val Val Gly Val Ala  
 50 55 60

Ala Arg Asp Gly Asp Ser Ala Glu Val Val Val Asp Pro Ala Phe Arg  
 65 70 75 80

Arg Gln Gly Tyr Gly Ser Phe Leu Ile Arg His Val Val Ser Gln Gly  
85 90 95

Val Lys Asn Val Trp Ala His Gly Asp Gly Ala Gly Ala Lys Ala Val  
100 105 110

Ala Lys Ala Leu Gln Leu Glu Gln Thr Arg Gln Leu Leu Val Met Ala  
115 120 125

Val Glu Gly Asp Arg Leu Val Glu Ser Ala Gln Leu Gln Val Pro Ser  
130 135 140

Gly Phe Arg Val Leu Ala Leu Asn Glu Ala Tyr Glu Ser Ile Pro Asp  
145 150 155 160

Ile Glu Gln Gln Trp Leu Arg Val Asn Asn Glu Ala Phe Glu Trp His  
165 170 175

Pro Glu Gln Gly Gly Trp Asp Ser Ala Arg Leu Ala Gln Ala Arg Asp  
180 185 190

Thr Gln Trp Phe Arg Glu Ser Asp Val Leu Phe Leu Ile Asp Thr Ala  
195 200 205

Lys Arg Thr Val Ala Gly Phe His Trp Thr Lys Arg His Gly Asp Leu  
210 215 220

Ala Glu Gly Ala Asp Gly Glu Val Tyr Val Val Gly Leu Gly Ser Ala  
225 230 235 240

Tyr Arg Arg Arg Gly Leu Gly Asp Leu Leu Ile Arg Met Gly Leu His  
245 250 255

His Leu Glu Tyr Glu His Ala Arg Arg Val Ile Leu Tyr Val Glu Gly  
260 265 270

Asp Asn Glu Ser Ala Arg Arg Ala Tyr Asp Ala Leu Gly Phe His Val  
275 280 285

Val Glu Ser His Val Thr Tyr Ser Pro Gln Ser Ser Ser  
290 295 300

<210> 19  
<211> 434  
<212> PRT

<213> Mycobacterium smegmatis

<400> 19

Val Arg Leu Ala Thr Asp Leu Glu Thr Pro Arg Arg Val Ala Val Leu  
1 5 10 15

Ser Val His Thr Ser Pro Leu Ala Gln Pro Gly Thr Gly Asp Ala Gly  
20 25 30

Gly Met Asn Val Tyr Val Leu Gln Thr Ala Leu Gln Leu Ala Arg Arg  
35 40 45

Gly Val Glu Val Glu Val Phe Thr Arg Ala Thr Ser Ser Ala Asp Ala  
50 55 60

Pro Val Val Pro Val Ala Pro Gly Val Leu Val Arg Asn Val Val Ala  
65 70 75 80

Gly Pro Phe Glu Gly Leu Asp Lys Asn Asp Leu Pro Thr Gln Leu Cys  
85 90 95

Ala Phe Thr Ala Gly Val Leu Arg Ala Glu Ala Thr His Glu Pro Gly  
100 105 110

Tyr Tyr Asp Val Val His Ser His Tyr Trp Leu Ser Gly Gln Val Gly  
115 120 125

Trp Leu Ala Arg Asp Arg Trp Ala Val Pro Leu Val His Thr Ala His  
130 135 140

Thr Leu Ala Ala Val Lys Asn Ala Ala Leu Ala Ala Gly Asp Ala Pro  
145 150 155 160

Glu Pro Pro Leu Arg Ala Val Gly Glu Gln Gln Val Val Asp Glu Ala  
165 170 175

Asp Arg Leu Ile Val Asn Thr Glu Val Glu Ala Gln Gln Leu Val Ser  
180 185 190

Leu His Asn Ala Asp Arg Ser Arg Ile Asp Val Val His Pro Gly Val  
195 200 205

Asp Leu Asp Val Phe Thr Pro Gly Ser Arg Asp Ala Ala Arg Ala Val  
210 215 220

Phe Gly Leu Pro Thr Asp Gln Lys Ile Val Ala Phe Val Gly Arg Ile

225		230		235		240
Gln Pro Leu Lys	Ala Pro Asp Ile Leu	Leu Arg Ala Ala	Ala Lys Leu			
	245	250	255			
Pro Gly Val Arg	Val Leu Ile Ala	Gly Gly Pro Ser	Gly Ser Gly Leu			
	260	265	270			
Ala Gln Pro Asp	Thr Leu Val Arg	Leu Ala Asp Glu	Leu Gly Ile Ser			
	275	280	285			
Asp Arg Val Thr	Phe Leu Pro Pro	Gln Ser Arg Glu	Gln Leu Val Asn			
	290	295	300			
Val Tyr Arg Ala	Ala Asp Leu Val	Ala Val Pro Ser	Tyr Ser Glu Ser			
	305	310	315	320		
Phe Gly Leu Val	Ala Val Glu Ala	Gln Ala Cys Gly	Thr Pro Val Val			
	325	330	335			
Ala Ala Ala Val	Gly Gly Leu Pro	Val Ala Val Ala	Asp Gly Val Ser			
	340	345	350			
Gly Ala Leu Val	Asp Gly His Asp	Ile Gly Asp Trp	Ala Asp Thr Ile			
	355	360	365			
Ser Glu Val Leu	Asp Arg Glu Pro	Ala Ala Leu Ser	Arg Ala Ser Ala			
	370	375	380			
Glu His Ala Ala	Gln Phe Ser Trp	Ala His Thr Val	Asp Ala Leu Leu			
	385	390	395	400		
Ala Ser Tyr Ser	Arg Ala Met Ser	Asp Tyr Arg Ala	Arg His Pro Arg			
	405	410	415			
Pro Ala Ala Arg	Arg Ser Gly Arg	Arg Phe Ser Met	Arg Arg Gly Val			
	420	425	430			

Arg Thr

<210> 20  
 <211> 480  
 <212> PRT  
 <213> Mycobacterium tuberculosis  
 <400> 20

Met Ala Gly Val Arg His Asp Asp Gly Ser Gly Leu Ile Ala Gln Arg  
 1 5 10 15  
 Arg Pro Val Arg Gly Glu Gly Ala Thr Arg Ser Arg Gly Pro Ser Gly  
 20 25 30  
 Pro Ser Asn Arg Asn Val Ser Ala Ala Asp Asp Pro Arg Arg Val Ala  
 35 40 45  
 Leu Leu Ala Val His Thr Ser Pro Leu Ala Gln Pro Gly Thr Gly Asp  
 50 55 60  
 Ala Gly Gly Met Asn Val Tyr Met Leu Gln Ser Ala Leu His Leu Ala  
 65 70 75 80  
 Arg Arg Gly Ile Glu Val Glu Ile Phe Thr Arg Ala Thr Ala Ser Ala  
 85 90 95  
 Asp Pro Pro Val Val Arg Val Ala Pro Gly Val Leu Val Arg Asn Val  
 100 105 110  
 Val Ala Gly Pro Phe Glu Gly Leu Asp Lys Tyr Asp Leu Pro Thr Gln  
 115 120 125  
 Leu Cys Ala Phe Ala Ala Gly Val Leu Arg Ala Glu Ala Val His Glu  
 130 135 140  
 Pro Gly Tyr Tyr Asp Ile Val His Ser His Tyr Trp Leu Ser Gly Gln  
 145 150 155 160  
 Val Gly Trp Leu Ala Arg Asp Arg Trp Ala Val Pro Leu Val His Thr  
 165 170 175  
 Ala His Thr Leu Ala Ala Val Lys Asn Ala Ala Leu Ala Asp Gly Asp  
 180 185 190  
 Gly Pro Glu Pro Pro Leu Arg Thr Val Gly Glu Gln Gln Val Val Asp  
 195 200 205  
 Glu Ala Asp Arg Leu Ile Val Asn Thr Asp Asp Glu Ala Arg Gln Val  
 210 215 220  
 Ile Ser Leu His Gly Ala Asp Pro Ala Arg Ile Asp Val Val His Pro  
 225 230 235 240

Gly Val Asp Leu Asp Val Phe Arg Pro Gly Asp Arg Arg Ala Ala Arg  
 245 250 255  
 Ala Ala Leu Gly Leu Pro Val Asp Glu Arg Val Val Ala Phe Val Gly  
 260 265 270  
 Arg Ile Gln Pro Leu Lys Ala Pro Asp Ile Val Leu Arg Ala Ala Ala  
 275 280 285  
 Lys Leu Pro Gly Val Arg Ile Ile Val Ala Gly Gly Pro Ser Gly Ser  
 290 295 300  
 Gly Leu Ala Ser Pro Asp Gly Leu Val Arg Leu Ala Asp Glu Leu Gly  
 305 310 315 320  
 Ile Ser Ala Arg Val Thr Phe Leu Pro Pro Gln Ser His Thr Asp Leu  
 325 330 335  
 Ala Thr Leu Phe Arg Ala Ala Asp Leu Val Ala Val Pro Ser Tyr Ser  
 340 345 350  
 Glu Ser Phe Gly Leu Val Ala Val Glu Ala Gln Ala Cys Gly Thr Pro  
 355 360 365  
 Val Val Ala Ala Ala Val Gly Gly Leu Pro Val Ala Val Arg Asp Gly  
 370 375 380  
 Ile Thr Gly Thr Leu Val Ser Gly His Glu Val Gly Gln Trp Ala Asp  
 385 390 395 400  
 Ala Ile Asp His Leu Leu Arg Leu Cys Ala Gly Pro Arg Gly Arg Val  
 405 410 415  
 Met Ser Arg Ala Ala Ala Arg His Ala Ala Thr Phe Ser Trp Glu Asn  
 420 425 430  
 Thr Thr Asp Ala Leu Leu Ala Ser Tyr Arg Arg Ala Ile Gly Glu Tyr  
 435 440 445  
 Asn Ala Glu Arg Gln Arg Arg Gly Gly Glu Val Ile Ser Asp Leu Val  
 450 455 460  
 Ala Val Gly Lys Pro Arg His Trp Thr Pro Arg Arg Gly Val Gly Ala  
 465 470 475 480

<211> 425  
 <212> PRT  
 <213> Anabaena PCC7120

<400> 21

Met Phe Gln Asn Lys Lys His Arg Ile Ala Leu Ile Ser Val Ser Gly  
 1 5 10 15

Asp Pro Ala Val Glu Ile Gly Gln Glu Glu Ala Gly Gly Gln Asn Val  
 20 25 30

Tyr Val Arg Glu Val Gly Tyr Ala Leu Ala Glu Gln Gly Trp Gln Val  
 35 40 45

Asp Met Phe Thr Arg Arg Ile Ser Pro Asp Gln Ala Glu Ile Val Gln  
 50 55 60

His Ser Pro Asn Cys Arg Thr Ile Arg Leu Gln Ala Gly Pro Val Glu  
 65 70 75 80

Phe Ile Gly Arg Asp His Val Phe Asp Tyr Leu Pro Glu Phe Val Ala  
 85 90 95

Glu Phe Gln Arg Phe Gln Lys Arg Gln Gly Tyr Asn Tyr Gln Leu Ile  
 100 105 110

His Thr Asn Tyr Trp Leu Ser Ser Trp Val Gly Met Gln Leu Lys Lys  
 115 120 125

Gln Gln Pro Leu Val Leu Val His Thr Tyr His Ser Leu Gly Ala Ile  
 130 135 140

Lys Tyr Gln Thr Ile Ala Asp Ile Pro Ala Ile Ala Asn Gln Arg Leu  
 145 150 155 160

Ala Ile Glu Lys Ala Cys Leu Glu Ser Val Asp Thr Val Val Ala Thr  
 165 170 175

Ser Pro Gln Glu Gln Gln His Met Arg Ala Leu Val Ser Lys Lys Gly  
 180 185 190

Arg Ile Glu Met Ile Pro Cys Gly Thr Asp Ile Asn Asn Phe Gly Asn  
 195 200 205

Ile Glu Lys Ser Ala Ala Arg Glu Lys Leu Gly Ile Glu Pro Asp Ala  
 210 215 220

Lys Met Val Phe Tyr Val Gly Arg Phe Asp Pro Arg Lys Gly Ile Glu  
 225 230 235 240

Thr Leu Val Arg Ala Val Ala Gln Ser Arg Leu Arg Gly Glu Ala Asn  
 245 250 255

Leu Gln Leu Val Ile Gly Gly Gly Ser Arg Pro Gly Gln Ser Asp Gly  
 260 265 270

Arg Glu Arg Asp Arg Ile Ala Asn Ile Val Ala Glu Leu Glu Leu Asn  
 275 280 285

Asp Cys Thr Thr Phe Ala Gly Arg Leu Asp His Glu Ile Leu Pro Tyr  
 290 295 300

Tyr Tyr Ala Ala Ala Asp Val Cys Val Val Pro Ser His Tyr Glu Pro  
 305 310 315 320

Phe Gly Leu Val Ala Ile Glu Ala Met Ala Ser Lys Thr Pro Val Ile  
 325 330 335

Ala Ser Asn Val Gly Gly Leu Gln Phe Thr Val Val Pro Glu Val Thr  
 340 345 350

Gly Leu Leu Ala Pro Pro Gln Asp Glu Ser Ala Phe Ala Thr Ala Ile  
 355 360 365

Asp Arg Ile Leu Ala Asn Pro Thr Trp Arg Asp Gln Leu Gly Thr Ala  
 370 375 380

Ala Arg Gln Arg Val Glu Thr Thr Phe Ser Trp Ala Gly Val Ala Ser  
 385 390 395 400

Gln Leu Ser Gln Leu Tyr Thr His Leu Leu Thr Gln Asn Ala Pro Glu  
 405 410 415

Lys Lys Glu Lys Glu Ala Val Ala Ala  
 420 425

<210> 22

<211> 378

<212> PRT

<213> Mycobacterium tuberculosis

<400> 22

Val Cys Gly Val Arg Val Ala Ile Val Ala Glu Ser Phe Leu Pro Gln

1	5	10	15
Val Asn Gly	Val Ser Asn Ser	Val Val Lys Val	Leu Glu His Leu Arg
20		25	30
Arg Thr Gly	His Glu Ala Leu	Val Ile Ala Pro	Asp Thr Pro Pro Gly
35		40	45
Glu Asp Arg	Ala Glu Arg Leu	His Asp Gly Val	Arg Val His Arg Val
50		55	60
Pro Ser Arg	Met Phe Pro Lys	Val Thr Thr Leu	Pro Leu Gly Val Pro
65		70	75
Thr Phe Arg	Met Leu Arg Ala	Leu Arg Gly Phe	Asp Pro Asp Val Val
	85	90	95
His Leu Ala	Ser Pro Ala Leu	Leu Gly Tyr Gly	Gly Leu His Ala Ala
	100	105	110
Arg Arg Leu	Gly Val Pro Thr	Val Ala Val Tyr	Gln Thr Asp Val Pro
	115	120	125
Gly Phe Ala	Ser Ser Tyr Gly	Ile Pro Met Thr	Ala Arg Ala Ala Trp
	130	135	140
Ala Trp Phe	Arg His Leu His	Arg Leu Ala Asp	Arg Thr Leu Ala Pro
145		150	155
Ser Thr Ala	Thr Met Glu Ser	Leu Ile Ala Gln	Gly Ile Pro Arg Val
	165	170	175
His Arg Trp	Ala Arg Gly Val	Asp Val Gln Arg	Phe Ala Pro Ser Ala
	180	185	190
Arg Asn Glu	Val Leu Arg Arg	Arg Trp Ser Pro	Asp Gly Lys Pro Ile
	195	200	205
Val Gly Phe	Val Gly Arg Leu	Ala Pro Glu Lys	His Val Asp Arg Leu
	210	215	220
Thr Gly Leu	Ala Ala Ser Gly	Ala Val Arg Leu	Val Ile Val Gly Asp
225		230	235
Gly Ile Asp	Arg Ala Arg Leu	Gln Ser Ala Met	Pro Thr Ala Val Phe
	245	250	255

Thr Gly Ala Arg Tyr Gly Lys Glu Leu Ala Glu Ala Tyr Ala Ser Met  
                   260                  265                  270

Asp Val Phe Val His Ser Gly Glu His Glu Thr Phe Cys Gln Val Val  
           275                  280                  285

Gln Glu Ala Leu Ala Ser Gly Leu Pro Val Ile Ala Pro Asp Ala Gly  
       290                  295                  300

Gly Pro Arg Asp Leu Ile Thr Pro His Arg Thr Gly Leu Leu Leu Pro  
   305                  310                  315                  320

Val Gly Glu Phe Glu His Arg Leu Pro Asp Ala Val Ala His Leu Val  
                   325                  330                  335

His Glu Arg Gln Arg Tyr Ala Leu Ala Ala Arg Arg Ser Val Leu Gly  
                   340                  345                  350

Arg Ser Trp Pro Val Val Cys Asp Glu Leu Leu Gly His Tyr Glu Ala  
           355                  360                  365

Val Arg Gly Arg Arg Thr Thr Gln Ala Ala  
       370                  375

<210> 23  
 <211> 31  
 <212> DNA  
 <213> Artificial sequence

<220>  
 <223> PCR primer

<400> 23  
 ggcttgacagg tgacggcgct tgactggcgc t

31

<210> 24  
 <211> 30  
 <212> DNA  
 <213> Artificial sequence

<220>  
 <223> PCR primer

<400> 24  
 ggaagcttgt tatccgtgcc agccagcgcg

30

<210> 25  
 <211> 23  
 <212> DNA

<213> Artificial sequence

<220>

<223> PCR primer

<400> 25

catatgcacg gtcggcaagg agg

23

<210> 26

<211> 25

<212> DNA

<213> Artificial sequeunce

<220>

<223> PCR primer

<400> 26

aggatccatg gcaggtgtgc ggcac

25

<210> 27

<211> 22

<212> DNA

<213> Artificial sequence

<220>

<223> Amplification primer

<400> 27

gcaacgagaa ggccgtcgaa ct

22

<210> 28

<211> 22

<212> DNA

<213> Artificial sequence

<220>

<223> Amplification primer

<400> 28

gtcctcgatg atcttcctga ca

22

<210> 29

<211> 20

<212> DNA

<213> Artificial sequence

<220>

<223> Amplification primer

<400> 29

gcgtggcggt gttgtcggt

20

<210> 30

<211> 20

<212> DNA

<213> Artificial sequence

&lt;220&gt;

&lt;223&gt; Amplification primer

&lt;400&gt; 30

gaccagttgt tcgcggtctt

20

&lt;210&gt; 31

&lt;211&gt; 25

&lt;212&gt; PRT

&lt;213&gt; Mycobacterium smegmatis

&lt;400&gt; 31

Met	Tyr	Val	Cys	Gly	Ile	Thr	Pro	Tyr	Asp	Ala	Thr	His	Leu	Gly	His
1				5					10					15	

Ala	Ala	Thr	Tyr	Leu	Thr	Phe	Asp	Leu
			20					25

&lt;210&gt; 32

&lt;211&gt; 27

&lt;212&gt; PRT

&lt;213&gt; Mycobacterium leprae

&lt;400&gt; 32

Ala	Thr	Met	Tyr	Val	Cys	Gly	Ile	Thr	Pro	Tyr	Asp	Ala	Thr	His	Leu
1				5					10					15	

Gly	His	Ala	Ala	Thr	Tyr	Leu	Ala	Phe	Asp	Leu
			20						25	

&lt;210&gt; 33

&lt;211&gt; 25

&lt;212&gt; PRT

&lt;213&gt; Streptomyces coelicolor

&lt;400&gt; 33

Ile	Tyr	Val	Cys	Gly	Ile	Thr	Pro	Tyr	Asp	Ala	Thr	His	Met	Gly	His
1				5					10					15	

Ala	Ala	Thr	Tyr	Asn	Ala	Phe	Asp	Leu
			20					25

&lt;210&gt; 34

&lt;211&gt; 25

&lt;212&gt; PRT

&lt;213&gt; Corynebacterium striatum

&lt;400&gt; 34

Met	Tyr	Val	Cys	Gly	Ile	Thr	Pro	Tyr	Asp	Ser	Thr	His	Leu	Gly	His
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

1                      5                      10                      15

Ala Ala Thr Tyr Leu Thr Phe Asp Leu  
20 25

<210>	35
<211>	25
<212>	PRT
<213>	Thermomonospora fusca

<400> 35

Met Tyr Val Cys Gly Ile Thr Pro Tyr Asp Ala Ala His Leu Gly His  
1 5 10 15

Ala Phe Thr Tyr Leu Thr Phe Asp Leu  
20 25

```
<210> 36
<211> 25
<212> PRT
<213> Mycobacterium tuberculosis
```

<400> 36

Ile Tyr Leu Cys Gly Ala Thr Val Gln Gly Leu Pro His Ile Gly His  
1 5 10 15

Val Arg Ser Gly Val Ala Phe Asp Ile  
20 25

```
<210> 37
<211> 25
<212> PRT
<213> Escherichia coli
```

<400> 37

Met Tyr Val Cys Gly Ile Thr Val Tyr Asp Leu Cys His Ile Gly His  
1 5 10 15

Gly Arg Thr Phe Val Ala Phe Asp Val  
20 25

```
<210> 38
<211> 76
<212> PRT
<213> Mycobacterium smegmatis
```

<400> 38

Ser Pro Phe Gly Arg Gly Arg Pro Gly Trp His Val Glu Cys Ser Ala  
1 5 10 15

Ile Ala Leu Thr Arg Ile Gly Thr Gly Leu Asp Ile Gln Gly Gly Gly  
                   20                  25                  30

Ser Asp Leu Ile Phe Pro His His Glu Tyr Ser Ala Ala His Ala Glu  
           35                  40                  45

Ser Val Thr Gly Glu Arg Arg Phe Ala Arg His Tyr Val His Thr Gly  
       50                  55                  60

Met Ile Gly Trp Asp Gly His Lys Met Ser Lys Ser  
   65                  70                  75

<210> 39  
 <211> 76  
 <212> PRT  
 <213> Mycobacterium leprae

<400> 39

Ser Pro Phe Gly Pro Gly Arg Pro Gly Trp His Val Glu Cys Ala Ala  
   1                  5                  10                  15

Ile Ala Leu Ser Arg Ile Gly Ile Gly Leu Asp Ile Gln Gly Gly Gly  
           20                  25                  30

Ser Asp Leu Ile Phe Pro His His Glu Phe Thr Ala Ala His Ala Glu  
       35                  40                  45

Cys Val Arg Gly Glu Arg Arg Phe Ala Arg His Tyr Val His Ala Gly  
       50                  55                  60

Met Ile Gly Trp Asp Glu His Lys Met Ser Lys Ser  
   65                  70                  75

<210> 40  
 <211> 76  
 <212> PRT  
 <213> Streptomyces coelicolor

<400> 40

Gly Thr Leu Gly Arg Gly Arg Pro Gly Trp His Ile Glu Cys Val Ala  
   1                  5                  10                  15

Ile Ala Leu Asp His Leu Gly Met Gly Phe Asp Val Gln Gly Gly Gly  
       20                  25                  30

Ser Asp Leu Ala Phe Pro His His Glu Met Gly Ala Ser His Ala Gln

35                                      40                                      45  
 Ala Leu Thr Gly Glu Phe Pro Met Ala Lys Ala Tyr Val His Ala Gly  
     50                                      55                                      60  
  
 Met Val Gly Leu Asp Gly Glu Lys Met Ser Lys Ser  
     65                                      70                                      75  
  
 <210> 41  
 <211> 76  
 <212> PRT  
 <213> *Corynebacterium striatum*  
  
 <400> 41  
  
 Ser Pro Phe Gly Pro Gly Arg Pro Gly Trp His Val Glu Cys Ser Ala  
     1                                      5                                      10                                      15  
  
 Ile Ala Thr Asn Arg Leu Gly Ser His Phe Ala Ile Gln Gly Gly Gly  
             20                                      25                                      30  
  
 Ser Asp Leu Ala Phe Pro His His Glu Phe Ser Ala Ala His Ala Glu  
             35                                      40                                      45  
  
 Ala Ala Leu Lys Val Glu Arg Met Ala Gly His Tyr Val His Ala Gly  
     50                                      55                                      60  
  
 Met Ile Ala Leu Asp Gly Val Lys Met Ser Lys Ser  
     65                                      70                                      75  
  
 <210> 42  
 <211> 76  
 <212> PRT  
 <213> *Thermomonospora fusca*  
  
 <400> 42  
  
 Thr Pro Leu Gly Arg Gly Arg Pro Gly Trp His Val Glu Cys Ser Ala  
     1                                      5                                      10                                      15  
  
 Ile Ser Val His Glu Leu Gly Met Gly Phe Asp Leu Asn Gly Gly Gly  
             20                                      25                                      30  
  
 Asp Asp Leu Ile Phe Pro His His Glu Met Gly Ala Ala Glu Ala Cys  
             35                                      40                                      45  
  
 Cys Ala Thr Gly Ser Arg Pro Gln Ala Arg His Tyr Leu His Val Ala  
     50                                      55                                      60

Met Val Gly Leu Asp Gly Glu Lys Met Ser Lys Ser  
 65 70 75

<210> 43  
 <211> 74  
 <212> PRT  
 <213> Mycobacterium tuberculosis

<400> 43

Thr Pro Trp Gly Arg Gly Arg Pro Gly Trp His Leu Glu Cys Ser Ala  
 1 5 10 15

Met Ala Arg Ser Tyr Leu Gly Pro Glu Phe Asp Ile His Cys Gly Gly  
 20 25 30

Met Asp Leu Val Phe Pro His His Glu Asn Glu Ile Ala Gln Ser Arg  
 35 40 45

Ala Ala Gly Asp Gly Phe Ala Arg Tyr Trp Leu His Asn Gly Trp Val  
 50 55 60

Thr Met Gly Gly Glu Lys Met Ser Lys Ser  
 65 70

<210> 44  
 <211> 74  
 <212> PRT  
 <213> Escherichia coli

<400> 44

Pro Trp Gly Ala Gly Arg Pro Gly Trp His Ile Glu Cys Ser Ala Met  
 1 5 10 15

Asn Cys Lys Gln Leu Gly Asn His Phe Asp Ile His Gly Gly Gly Ser  
 20 25 30

Asp Leu Met Phe Pro His His Glu Asn Glu Ile Ala Gln Ser Thr Cys  
 35 40 45

Ala His Asp Gly Gln Tyr Val Asn Tyr Trp Met His Ser Gly Met Val  
 50 55 60

Met Val Asp Arg Glu Lys Met Ser Lys Ser  
 65 70

<210> 45  
 <211> 24  
 <212> DNA

<213> Artificial sequence

<220>

<223> Forward primer

<400> 45

tcccccgga cgcgtggcgc tgat

24

<210> 46

<211> 29

<212> DNA

<213> Artificial sequence

<220>

<223> Reverse primer

<400> 46

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<400> 47

His Gly Leu His

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<210> 48

<211> 538

<212> DNA

<213> Mycobacterium smegmatis

<400> 48

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<212> DNA

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